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5 Ron, Eliora
Orr, Elisha
Paitan, Yossi

<120> GENE CLUSTER

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<141> 2000-11-10

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40 Arg Ser Glu His Glu His Val Leu Leu Cys Phe His His Leu Val

D)

Sub
E1

RECEIVED

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AUG 19 2002

Leu Asp Gly Ala Ser Val Ala Pro Leu Leu Asp Ala Leu Arg Glu Arg
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TECH CENTER 1600/2900

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Tyr Ala Gly Thr Glu Ala Lys Ala Gly Leu Leu Glu Val Pro Ile Val
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Ala Pro Tyr Arg Ala Ala Val Glu Trp Glu Gln Leu Ala Ile Gly Gly
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Asp Glu Gly Arg Arg His Leu Asp Tyr Trp Arg His Val Leu Ala Thr
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Thr Gly Leu Asp Ser Glu Gly Ala Thr His Ser Gln Arg Val Pro Thr
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His Leu His Asp Ser Val Ile Asp Gly Leu Glu His Ala His Tyr Pro
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Glu Pro Leu Asp Cys Val His Gln Glu Gly Ala Tyr Pro Leu Glu Leu

340 345 350

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Glu Val Val Glu Gly Ala Lys Gly Leu Thr Leu His Phe Lys Tyr Asp

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Ala Arg Leu Tyr Glu Ala Asp Thr Val Glu Arg Met Ala Arg Gln Leu

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Leu Phe Gln Arg Gln Ala Arg Glu Thr Pro Asp Ala Met Ala Val Ser

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Glu Ile Ala Ala His Leu Lys Ser Phe Gly Val Lys Pro Gly Ala Leu

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35 Val Gly Ile Tyr Leu Asp Arg Ser Ala Glu Leu Val Ala Ala Met Leu

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Gly Val Leu Ser Ala Gly Ala Ala Tyr Val Pro Leu Asp Pro Val His

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Ala Ser Cys Lys Val Cys Val Leu Glu Asp Val Lys Ala Gly Ala Thr

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Gly Val Val Asn Phe Leu Leu Cys Met Arg Arg Thr Leu Gly Leu Lys

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25 Ala Ser Ala Glu Thr Val Arg Asp Ala Gln Ala Leu Lys Arg Ala Leu

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40 Trp Ser Thr Met Ala Lys Val Ser Ala Ser Arg Pro Val Thr Ile Gly

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735

Lys Pro Ile Asp Asn Thr Gln Val Val Leu Asp Asp Arg Met Gln

740

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Pro Val Pro Ile Gly Val Pro Gly Glu Leu Trp Ile Ala Gly Ala Gly

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760

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Val Ala Cys Gly Tyr Leu Asn Arg Pro Ala Leu Thr Ala Glu Arg Phe

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780

Val Ser Asn Pro Phe Thr Pro Gly Thr Thr Leu Tyr Arg Thr Gly Asp

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795

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Leu Ala Arg Trp Arg Ala Asp Gly Glu Val Glu Tyr Leu Gly Arg Leu

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810

815

Asp His Gln Val Lys Val Arg Gly Phe Arg Ile Glu Met Gly Glu Ile

820

825

830

20

D) Glu Ala Gln Leu Ala Gly His Pro Ser Val Lys Asn Cys Ala Val Val

835

840

845

Ala Lys Glu Leu Asn Gly Thr Ser Gln Leu Val Ala Tyr Cys Gln Pro

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850

855

860

Ala Gly Thr Ser Phe Asp Glu Glu Ala Ile Arg Ala His Leu Arg Lys

865

870

875

880

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Phe Leu Pro Asp Tyr Met Val Pro Ala His Val Phe Ala Val Asp Ala

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890

895

Ile Pro Leu Ser Gly Asn Gly Lys Val Asp Arg Gly Gln Leu Met Ala

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905

910

35

Arg Pro Val Val Thr Arg Arg Lys Thr Ser Ala Val His Ala Arg Ser

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920

925

Pro Val Glu Ala Thr Leu Val Glu Leu Trp Lys Asn Val Leu Gln Val

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930

935

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Glu Pro Ala Arg Glu Asp Thr Ala Ser Glu Arg Asp Tyr Glu Gly Ser
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Cys Phe Asp Pro His Phe Phe Gly Leu Thr Ala Arg Asp Ala Ser Phe
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Val Leu Ala Gln Ala Gly Ser Ile Pro Thr Met Val Ser Tyr Lys Leu

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Gly Tyr Leu His Gln Arg Gly Leu Asn Phe Ser Ser Ala Gly Arg Val

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Asp Lys Val Gly Leu Tyr Ala Pro Ser Ala Thr Gly Gln Ala Glu Val

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Val Ser Ala Leu Ser Glu Ala Phe Arg Thr Phe Thr Asp Arg Arg Gly

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40 Tyr Cys Arg Leu Gly Ser Val Lys Ser Asn Leu Gly His Leu Asp Thr

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Val Ala Gly Leu Ala Gly Leu Ile Lys Thr Ala Leu Ser Leu Arg Gln
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Glu Leu Thr Asp Ser Pro Phe Val Ile Ala Asp Arg Leu Ala Pro Trp
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Pro Ser Leu Pro Gly Pro Arg Arg Ala Ala Val Ser Ala Phe Gly Leu
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Ala Thr Gly Asp Ser Ile Asp Trp Asp Ser Leu His Gly Asp Val Lys
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Pro Ala Arg Val Ser Leu Pro Thr Tyr Gln Phe Ala Lys Glu Arg Tyr

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Asp Ala Gly Val Pro Leu Phe Val Pro Thr Trp Gln Pro Trp Ser Glu

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Gly Ala Ser Asn Ala Ser Leu Ala Leu Arg His Leu Val Val Leu Cys

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Glu Pro Leu Asp Ala Leu Gly Ala Glu Gly Ala Ser Ala Leu Ala Ser

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Thr Leu Ala Asp Arg Arg Ile Glu Val Val Arg Thr Ser Ser Pro Ser

1665 1670 1675 1680

D) 20 Ala Arg Leu Asp Ala Arg Phe Met Ala His Ala Ser Ala Val Phe Glu

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Arg Val Lys Ala Leu Leu Ser Glu Arg Leu Thr Ala Pro Val Thr Leu

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Gln Val Leu Val Pro Glu Glu Arg Asp Ala Leu Ala Leu Ser Gly Leu

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Gly Ser Leu Leu Arg Ser Val Ser Gln Glu Asn Pro Leu Val Arg Gly

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Gln Leu Ile Arg Val Gln Gly Ser Val Ser Ala Ser Ala Leu Val Asp

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His Ala Gly Gln Leu Ser Arg Cys Glu Trp Arg Glu Ala Arg Val Ala

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Lys Gly Asp Ala Ser Arg Phe Trp Arg Glu Asp Gly Val Tyr Val Ile

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1805

Ser Gly Gly Thr Gly Ala Leu Ala Arg Leu Phe Val Ala Glu Ile Gly

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1815

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1855

Val Asp Val Thr Gln Pro Asn Asp Val Asn Ala Phe Val Ala Thr Val

1860

1865

1870

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Leu Arg Glu His Gly Arg Ile Asp Gly Val Ile His Ala Ala Gly Ile

1875

1880

1885

D | Arg Arg Asp Asn Tyr Leu Leu Asn Pro Val Ala Glu Met Gln Ala

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1890

1895

1900

Val Leu Ala Pro Lys Val Val Gly Leu Val Asn Leu Asp His Ala Thr

1905

1910

1915

1920

25

Arg Glu Leu Pro Leu Asp Phe Phe Val Thr Phe Ser Ser Leu Ala Ala

1925

1930

1935

Phe Gly Asn Ala Gly Gln Ser Asp Tyr Ala Ala Ala Asn Gly Phe Met

1940

1945

1950

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Asp Gly Phe Ala Glu Ser Arg Ala Ala Leu Val Asn Ala Gly Gln Arg

1955

1960

1965

Gln Gly Arg Thr Val Ser Ile Arg Trp Pro Leu Trp Glu Asn Gly Gly

35

1970

1975

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Met Gln Leu Asp Ser Arg Ser Arg Glu Val Leu Met Gln Arg Thr Gly

1985

1990

1995

2000

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Met Ala Ala Leu Gly Asp Glu Ala Gly Leu Gly Ala Phe Tyr Arg Ala

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Gly Pro Ser Met Pro Val Asp Thr Met Cys Ser Ala Ser Leu Thr Ala
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cgcgagctgc ccctggattt ctctcgatcc tggttgcgtt tgaaacgc 5820
ggtcagtcgg actacgcggc ggc当地ggc ttcatggacg gattcgcggc gtcccgagcg 5880
20 ggcgtcgta acggccggaca gcccggggc cggacgggtt ccattccgtg ggcgcctgg 5940
gagaacggcg ggtatgcagct cgactcacgg agccgtgagg tcttgcac gccggaccgg 6000
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gtttcggcccg caccggccccc gcatcagggtg ggc当地ggacg ccgtgggtgtc catcaccgag 6180
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30 gatgcgacgc accggggcgc tcgcggcgc gaggccatcg ccgtcatgg catgagcggc 6540
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35 caggagcgct tgccctgca gagctgtgg gaggcttgg aggacgcggg gtc当地ccgg 6840
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cccgtggaca ccatgtgctc ggc当地cgctg acagccgtcc acatggctlg cgaggcgctg 7080
40 caacgaggcg cctcgctcat ggccatcgcc ggtggagtgta atctctacgt ccacccgtcg 7140

D)

agctacgtca gcctgtccgg gcagcagatg ctgtcgac

7178

<210> 3

5 <211> 785

<212> Amino acid

<213> Myxococcus xanthus

<400> 3

10 Met Lys Val Val Asn Lys Leu Leu Glu Lys Leu Pro Asp Val Val Ala

1 5 10 15

Gly Lys Val Pro Asp Val Lys Leu Gln Asp Gln Asp Ile Lys Val Pro

20 25 30

15

Leu Ala Gln Gly Thr Phe Thr Glu Glu Lys Ile Leu Pro Pro Lys Leu

35 40 45

Ala Met His Gly Phe Thr Leu Ser Phe Glu Ala Thr Gly Glu Ala Ser

D) 20 50 55 60

Ile Arg Asn Phe Asn Ser Leu Gly Asp Val Asp Glu Asn Gly Ile Ile

65 70 75 80

25 Gly Glu Pro Ser Pro Glu Ser Ala Glu Pro Gly Pro Arg Pro Gln Leu

85 90 95

Leu Leu Gly Ser Asp Ile Gly Trp Met Arg Tyr Gln Val Ser Ala Arg

100 105 110

30

Val Lys Ala Ala Val Ser Ala Ser Leu Ser Phe Leu Ala Ser Glu Asn

115 120 125

Gln Thr Glu Leu Ser Val Thr Leu Ser Asp Tyr Arg Ala His Pro Leu

35 130 135 140

Gly Gln Asn Met Arg Glu Ala Val Arg Ser Asp Leu Ser Glu Leu Arg

145 150 155 160

40 Leu Met Gln Ala Thr Asp Leu Ala Lys Leu Thr Thr Gly Asp Ala Val

165 170 175

Ala Trp His Val Arg Gly Ala Leu His Thr Arg Leu Glu Leu Asn Trp

180 185 190

5

Ala Asp Ile Phe Pro Thr Asn Leu Asn Arg Leu Gly Phe Leu Arg Gly

195 200 205

Asn Glu Leu Leu Ala Leu Lys Thr Ser Ala Lys Ala Gly Leu Ser Ala

10 210 215 220

Arg Val Ser Leu Thr Asp Asp Tyr Gln Leu Ser Phe Ser Arg Pro Arg

225 230 235 240

15 Ala Gly Arg Ile Gln Val Ala Val Arg Lys Val Lys Ser His Glu Gln

245 250 255

Ala Leu Ser Ala Gly Leu Gly Ile Thr Val Glu Leu Leu Asp Pro Ala

260 265 270

20

Thr Val Lys Ala Gln Leu Gly Gln Leu Leu Glu Ala Leu Leu Gly Pro

275 280 285

Val Leu Arg Asp Leu Val Lys Lys Gly Thr Thr Ala Val Glu Ile Met

25 290 295 300

Asp Gly Leu Val Asp Lys Ala Ser Lys Ala Lys Leu Asp Asp Asn Gln

305 310 315 320

30 Lys Lys Val Leu Gly Leu Val Leu Glu Arg Leu Gly Ile Asp Pro Gln

325 330 335

Leu Ala Asp Pro Ala Asn Leu Pro Gln Ala Trp Ala Asp Phe Lys Ala

340 345 350

35

Arg Val Ala Glu Ser Leu Glu Asn Ala Val Arg Thr Gln Val Ala Glu

355 360 365

Gly Phe Glu Tyr Glu Tyr Leu Arg Leu Ser Glu Thr Ser Thr Leu Leu

40 370 375 380

D)

Glu Val Val Val Glu Asp Val Thr Ala Met Arg Phe His Glu Ser Leu
385 390 395 400

5 Leu Lys Gly Asn Leu Val Glu Leu Leu Lys Trp Met Lys Ser Leu Pro
 405 410 415

Ala Gln Gln Ser Glu Phe Glu Leu Arg Asn Tyr Leu His Ala Thr Thr
 420 425 430

10 Leu Thr Arg Gln Gln Ala Ile Gly Phe Ser Leu Gly Leu Gly Ser Phe
 435 440 445

Glu Leu Leu Lys Ala Lys Asn Val Ser Lys Gln Ser Trp Val Thr Gln
15 450 455 460

Glu Asn Phe Gln Gly Ala Arg Arg Met Ala Phe Leu Gly Arg Arg Gly
465 470 475 480

D| 20 Tyr Glu Asp Lys Leu Leu Gly Thr Arg Gly Gln Trp Val Val Asp Leu
 485 490 495

Lys Ala Asp Met Thr Arg Phe Ser Pro Thr Pro Val Ala Ser Asp Phe
 500 505 510

25 Gly Tyr Gly Leu His Leu Met Leu Trp Gly Arg Gln Lys Lys Leu Ser
 515 520 525

Arg Lys Asp Leu Gln Gln Ala Val Asp Asp Ala Val Val Trp Gly Val
30 530 535 540

Leu Asp Ala Lys Asp Ala Ala Thr Val Ile Ser Thr Met Gln Glu Asp
545 550 555 560

35 Met Gly Lys His Pro Ile Glu Thr Arg Leu Glu Leu Lys Met Ala Asp
 565 570 575

Asp Ser Phe Arg Ala Leu Val Pro Arg Ile Gln Thr Leu Glu Leu Ser
 580 585 590

Arg Phe Ser Arg Ala Leu Ala Arg Ala Leu Pro Trp Ser Glu Gln Leu

595 600 605

Pro Arg Ala Ser Ala Glu Phe Arg Arg Ala Val Tyr Ala Pro Ile Trp

5 610 615 620

Glu Ala Tyr Leu Arg Glu Val Gln Glu Gln Gly Ser Leu Met Leu Asn

625 630 635 640

10 Asp Leu Ser Pro Ser Arg Ala Ala Gln Ile Ala Lys Trp Tyr Phe Gln

645 650 655

Lys Asp Pro Thr Val Arg Asp Leu Gly Lys Asp Leu Gln Leu Ile Glu

660 665 670

15

Ser Glu Trp Arg Pro Gly Gly Asn Phe Ser Phe Ala Glu Val Ile

675 680 685

Ser Lys Asn Pro Asn Thr Leu Met Arg Cys Arg Asn Phe Val Ser Gly

20 690 695 700

Met Val Arg Leu Arg Arg Ala Ile Asp Glu Arg Lys Ala Pro Asp Glu

705 710 715 720

25 Leu Arg Thr Val Phe Gly Glu Leu Glu Gly Met Trp Thr Thr Gly Phe

725 730 735

His Leu Arg Ala Ala Gly Ser Leu Leu Ser Asp Leu Ala Gln Ser Thr

740 745 750

30

Pro Leu Gly Leu Ala Gly Val Glu Arg Thr Leu Thr Val Arg Val Ala

755 760 765

Asp Ser Glu Glu Gln Leu Val Phe Ser Thr Ala Arg Ser Thr Gly Ala

35 770 775 780

Ala

785

40

<210> 4

<211> 529

<212> Amino acid

<213> Myxococcus xanthus

5

<400> 4

Met Pro Ser Gly Cys Tyr Gly Ala Ala Ser Ala Phe Val Leu Pro Pro

1

5

10

15

10 Leu Pro Ala Met Pro Gln Ala Pro Ser Asp Val Ser Gln Val Leu Leu

20

25

30

Pro Phe Gly Gly Leu Val Gly Arg Glu Val Asp Leu Asp Ala Phe Leu

35

40

45

15

Gln Thr Leu Met Asp Arg Ile Ala Ile Thr Leu Gln Ala Asp Arg Gly

50

55

60

D)

Thr Leu Trp Leu Leu Asp Pro Ala Arg Arg Glu Leu Phe Ser Arg Ala

20

65

70

75

80

Ala His Leu Pro Glu Val Ser Gln Ile Arg Val Lys Leu Gly Gln Gly

85

90

95

25

Val Ala Gly Thr Val Ala Lys Ala Gly His Ala Ile Asn Val Pro Asp

100

105

110

Pro Arg Gly Glu Gln Arg Phe Phe Ala Asp Ile Asp Arg Met Thr Gly

115

120

125

30

Tyr Arg Thr Thr Ser Leu Leu Ala Val Pro Leu Arg Asp Gly Asp Gly

130

135

140

35

Ala Leu Tyr Gly Val Leu Gln Val Leu Asn Arg Arg Gly Glu Asp Arg

145

150

155

160

Phe Thr Asp Glu Asp Thr Gln Arg Leu Thr Ala Ile Ala Ser Gln Val

165

170

175

40

Ser Thr Ala Leu Gln Ser Thr Ser Leu Tyr Gln Glu Leu Gln Arg Ala

	180	185	190
5	Lys Glu Gln Pro Gln Val Pro Val Gly Tyr Phe Phe Asn Arg Ile Ile		
	195	200	205
10	Gly Glu Ser Pro Gln Leu Gln Ala Ile Tyr Arg Leu Val Arg Lys Ala		
	210	215	220
15	Ala Pro Thr Asp Ala Thr Val Leu Leu Arg Gly Glu Ser Gly Ser Gly		
	225	230	235
	Lys Glu Leu Phe Ala Arg Ala Val His Val Asn Gly Pro Arg Arg Asp		
	245	250	255
20	Gln Pro Phe Ile Lys Val Asp Cys Ala Ala Leu Pro Ala Thr Leu Ile		
	260	265	270
	Glu Asn Glu Leu Phe Gly His Glu Arg Gly Ala Phe Thr Gly Ala Asp		
	275	280	285
25	His Arg Val Pro Gly Lys Phe Glu Ala Ala Ser Gly Gly Thr Val Phe		
	290	295	300
	Ile Asp Glu Ile Gly Glu Leu Pro Leu Pro Val Gln Gly Lys Leu Leu		
	305	310	315
30	Arg Val Ile Gln Asp Arg Glu Phe Glu Arg Val Gly Gly Thr Gln Ala		
	325	330	335
35	Val Lys Val Asp Val Arg Ile Val Ala Ala Thr His Arg Asp Leu Ala		
	340	345	350
	Arg Met Val Ala Glu Gly Arg Phe Arg Glu Asp Leu Tyr Tyr Arg Ile		
	355	360	365
40	Lys Val Val Glu Val Val Leu Pro Pro Leu Arg Glu Arg Gly Ala Glu		
	370	375	380
	Asp Ile Glu Arg Leu Ala Arg His Phe Val Ala Ala Val Ala Arg Arg		
	395	400	

His Arg Leu Thr Pro Pro Arg Leu Ser Ala Ala Ala Val Glu Arg Leu

405

410

415

5 Lys Arg Tyr Arg Trp Pro Gly Asn Val Arg Glu Leu Glu Asn Cys Ile

420

425

430

Glu Ser Ala Val Val Leu Cys Glu Gly Glu Glu Ile Leu Glu Glu His Leu

435

440

445

10

Pro Leu Pro Asp Val Asp Arg Ala Ala Leu Pro Pro Pro Ala Ala Ala

450

455

460

Gln Gly Val Asn Ala Pro Thr Ala Pro Ala Pro Leu Asp Ala Gly Leu

15

465

470

475

480

Leu Pro Leu Ala Glu Val Glu Arg Arg His Ile Leu Arg Val Leu Asp

485

490

495

D |

20 Ala Val Lys Gly Asn Arg Thr Ala Ala Ala Arg Val Leu Ala Ile Gly

500

505

510

Arg Asn Thr Leu Ala Arg Lys Leu Lys Glu Tyr Gly Leu Gly Asp Glu

515

520

525

25

Pro

30 <210> 5

<211> 292

<212> Amino acid

<213> Myxococcus xanthus

35 <400> 5

Met Arg Ala Ser Gln Ala Glu Ala Pro His Ser Arg Arg Leu Thr Met

1

5

10

15

Glu Val Arg Phe His Gly Val Arg Gly Ser Ile Ala Val Ser Gly Ser

40

20

25

30

Arg Ile Gly Gly Asn Thr Ala Cys Val Glu Val Thr Ser Gln Gly His

35 40 45

5 Arg Leu Ile Leu Asp Ala Gly Thr Gly Ile Arg Ala Leu Gly Glu Ile

50 55 60

Met Met Arg Glu Gly Ala Pro Gln Glu Ala Thr Leu Phe Phe Ser His

65 70 75 80

10

Leu His Trp Asp His Val Gln Gly Phe Pro Phe Phe Thr Pro Ala Trp

85 90 95

Leu Pro Thr Ser Glu Leu Thr Leu Tyr Gly Pro Gly Ala Asn Gly Ala

15 100 105 110

Gln Ala Leu Gln Ser Glu Leu Ala Ala Gln Met Gln Pro Leu His Phe

115 120 125

D) 20 Pro Val Pro Leu Ser Thr Met Arg Ser Arg Met Asp Phe Arg Ser Ala

130 135 140

Leu His Ala Arg Pro Val Glu Val Gly Pro Phe Arg Val Thr Pro Ile

145 150 155 160

25

Asp Val Pro His Pro Gln Gly Cys Leu Ala Tyr Arg Leu Glu Ala Asp

165 170 175

Gly His Ser Phe Val Tyr Ala Thr Asp Val Glu Val Arg Val Gln Glu

30 180 185 190

Leu Ala Pro Glu Val Gly Arg Leu Phe Glu Gly Ala Asp Val Leu Cys

195 200 205

35 Leu Asp Ala Gln Tyr Thr Pro Asp Glu Tyr Glu Gly Arg Lys Gly Val

210 215 220

Ala Lys Lys Gly Trp Gly His Ser Thr Met Met Asp Ala Ala Gly Val

225 230 235 240

40

Ala Gly Leu Val Gly Ala Arg Arg Leu Cys Leu Phe His His Asp Pro

245

250

255

Ala His Gly Asp Asp Met Leu Glu Asp Met Ala Glu Gln Ala Arg Ala

5

260

265

270

Leu Phe Pro Val Cys Glu Pro Ala Arg Glu Gly Gln Arg Leu Val Leu

275

280

285

10 Gly Arg Ala Ala

290

<210> 6

15 <211> 168

<212> Amino acid

<213> Myxococcus xanthus

<400> 6

D | 20 Met Pro Gly Pro Arg Cys Ala Glu Asn Asp Trp Val Ala Leu Leu Val

1

5

10

15

Arg Val Asn His Glu Lys Val Ala Ala Ala Gln Leu Gly Lys His Gly

20

25

30

25

Tyr Glu Phe Phe Leu Pro Thr Tyr Thr Pro Pro Lys Ser Ser Gly Val

35

40

45

Lys Ala Lys Leu Pro Leu Phe Pro Gly Tyr Leu Phe Cys Arg Tyr Gln

30

50

55

?

60

Pro Leu Asn Pro Tyr Arg Ile Val Arg Ala Pro Gly Val Ile Arg Leu

65

70

75

80

35 Leu Gly Gly Asp Ala Gly Pro Glu Ala Val Pro Ala Gln Glu Leu Glu

85

90

95

Ala Ile Arg Arg Val Ala Asp Ser Gly Val Ser Ser Asn Pro Cys Asp

100

105

110

40

Tyr Leu Arg Val Gly Gln Arg Val Arg Ile Ile Glu Gly Pro Leu Thr

115 120 125

Gly Leu Glu Gly Ser Leu Val Thr Ser Lys Ser Gln Leu Arg Phe Ile

5 130 135 140

Val Ser Val Gly Leu Leu Gln Arg Ser Val Ser Val Glu Val Ser Ala

145 150 155 160

10 Glu Gln Leu Glu Pro Ile Thr Asp

165

<210> 7

15 <211> 79

<212> Amino acid

<213> Myxococcus xanthus

D1

<400> 7

20 Met Asp Lys Arg Ile Ile Phe Asp Ile Val Thr Ser Ser Val Arg Glu

1 5 10 15

Val Val Pro Glu Leu Glu Ser His Pro Phe Glu Pro Glu Asp Asp Leu

20 25 30

25 Val Gly Leu Gly Ala Asn Ser Leu Asp Arg Ala Glu Ile Val Asn Leu

35 40 45

Thr Leu Glu Lys Leu Ala Leu Asn Ile Pro Arg Val Glu Leu Ile Asp

30 50 55 60

Ala Lys Thr Ile Gly Gly Leu Val Asp Val Leu His Ala Arg Leu

65 70 75

35

<210> 8

<211> 420

<212> Amino acid

<213> Myxococcus xanthus

40

<400> 8

Met Gly Pro Val Gly Ile Glu Ala Met Asn Ala Tyr Cys Gly Ile Ala

1 5 10 15

5 Arg Leu Asp Val Leu Gln Leu Ala Thr His Arg Gly Leu Asp Thr Ser

20 25 30

Arg Phe Ala Asn Leu Leu Met Glu Glu Lys Thr Val Pro Leu Pro Tyr

35 40 45

10

Glu Asp Pro Val Thr Tyr Gly Val Asn Ala Ala Arg Pro Ile Leu Asp

50 55 60

Gln Leu Thr Ala Ala Glu Arg Asp Ser Ile Glu Leu Leu Val Ala Cys

15 65 70 75 80

Thr Glu Ser Ser Phe Asp Phe Gly Lys Ala Met Ser Thr Tyr Leu His

85 90 95

D |

20 Gln His Leu Gly Leu Ser Arg Asn Cys Arg Leu Ile Glu Leu Lys Ser

100 105 110

Ala Cys Tyr Ser Gly Val Ala Gly Leu Gln Met Ala Val Asn Phe Ile

115 120 125

25

Leu Ser Gly Val Ser Pro Gly Ala Lys Ala Leu Val Val Ala Ser Asp

130 135 140

Leu Ser Arg Phe Ser Ile Ala Glu Gly Gly Asp Ala Ser Thr Glu Asp

30 145 150 155 160

Trp Ser Phe Ala Glu Pro Ser Ser Gly Ala Gly Ala Val Ala Met Leu

165 170 175

35 Val Ser Asp Thr Pro Arg Val Phe Arg Val Asp Val Gly Ala Asn Gly

180 185 190

Tyr Tyr Gly Tyr Glu Val Met Asp Thr Cys Arg Pro Val Ala Asp Ser

195 200 205

40

Glu Ala Gly Asp Ala Asp Leu Ser Leu Leu Ser Tyr Leu Asp Cys Cys

210 215 220

Glu Asn Ala Phe Arg Glu Tyr Thr Arg Arg Val Pro Ala Ala Asn Tyr

5 225 230 235 240

Ala Glu Ser Phe Gly Tyr Leu Ala Phe His Thr Pro Phe Gly Gly Met

245 250 255

10 Val Lys Gly Ala His Arg Thr Met Met Arg Lys Phe Ser Gly Lys Asn

260 265 270

Arg Gly Asp Ile Glu Ala Asp Phe Gln Arg Arg Val Ala Pro Gly Leu

275 280 285

15

Thr Tyr Cys Gln Arg Val Gly Asn Ile Met Gly Ala Thr Met Ala Leu

290 295 300

D1 Ser Leu Leu Gly Thr Ile Asp His Gly Asp Phe Ala Thr Ala Lys Arg

20 305 310 315 320

Ile Gly Cys Phe Ser Tyr Gly Ser Gly Cys Ser Ser Glu Phe Phe Ser

325 330 335

25 Gly Val Val Thr Glu Glu Gln Gln Arg Gln Arg Ala Leu Gly Leu

340 345 350

Gly Glu Ala Leu Gly Arg Arg Gln Gln Leu Ser Met Pro Asp Tyr Asp

355 360 365

30

Ala Leu Leu Lys Gly Asn Gly Leu Val Arg Phe Gly Thr Arg Asn Ala

370 375 380

Glu Leu Asp Phe Gly Val Val Gly Ser Ile Arg Pro Gly Gly Trp Gly

35 385 390 395 400

Arg Pro Leu Leu Phe Leu Ser Ala Ile Arg Asp Phe His Arg Asp Tyr

405 410 415

40 Gln Trp Ile Ser

5 <210> 9
 5 <211> 325
 <212> Amino acid
 <213> *Myxococcus xanthus*

10 Met Ser Ser Val Ala Thr Ala Val Pro Leu Thr Ala Arg Asp Ser Ala
 1 5 10 15
 Val Ser Arg Arg Leu Arg Ile Thr Pro Ser Met Cys Gly Gln Thr Ser
 20 25 30
 15 Leu Phe Ala Gly Gln Ile Gly Asp Trp Ala Trp Asp Thr Val Ser Arg
 35 40 45
 D1 Leu Cys Gly Thr Asp Val Leu Thr Ala Thr Asn Ala Ser Gly Ala Pro
 20 50 55 60
 Thr Tyr Leu Ala Phe Tyr Tyr Phe Arg Ile Arg Gly Thr Pro Ala Leu
 65 70 75 80
 25 His Pro Gly Ala Leu Arg Phe Gly Asp Thr Leu Asp Val Thr Ser Lys
 85 90 95
 Ala Tyr Asn Phe Gly Ser Glu Ser Val Leu Thr Val His Arg Ile Cys
 100 105 110
 30 Lys Thr Ala Glu Gly Ala Pro Glu Ala Asp Ala Phe Gly His Glu
 115 120 125
 Glu Leu Tyr Glu Gln Pro Gln Pro Gly Arg Ile Tyr Ala Glu Thr Phe
 35 130 135 140
 Asn Arg Trp Ile Thr Arg Ser Asp Gly Lys Ser Asn Glu Ser Leu Ile
 145 150 155 160
 40 Lys Ser Ser Pro Val Gly Phe Gln Tyr Ala His Leu Pro Leu Pro

1 5 10 15

Val Leu Pro Arg Val Arg Ser Asn Glu Ile Ala Gly His Leu Asn Leu

20 25 30

5

Arg Glu Leu Gly Ala Asp Ser Val Asp Arg Val Glu Ile Leu Thr Ser

35 40 45

Ile Leu Asp Ser Leu Arg Leu Gln Lys Thr Pro Leu Ala Lys Phe Ala

10 50 55 60

Asp Ile Arg Asn Ile Asp Ala Leu Val Ala Phe Leu Ala Gly Glu Val

65 70 75 80

15 Ala Gly Gly

D1

<210> 11

20 <211> 374

<212> Amino acid

<213> Myxococcus xanthus

<400> 11

25 Met Met Gln Glu Arg Gly Val Ala Leu Pro Phe Glu Asp Pro Val Thr

1 5 10 15

Asn Ala Val Asn Ala Ala Arg Pro Ile Leu Asp Ala Met Ser Pro Glu

20 25 30

30

Ala Arg Glu Arg Ile Glu Leu Leu Val Thr Ser Ser Glu Ser Gly Val

35 40 45

Asp Phe Ser Lys Ser Ile Ser Ser Tyr Ala His Glu His Leu Gly Leu

35 50 55 60

Ser Arg His Cys Arg Phe Leu Glu Val Lys Gln Ala Cys Tyr Ala Ala

65 70 75 80

40 Thr Gly Ala Leu Gln Leu Ala Leu Gly Tyr Ile Ala Ser Gly Val Ser

Asp Ile Gly Gly His Leu Arg Gly Arg Arg Gln Leu Thr Phe Asp Gln
305 310 315 320

5 Tyr Val Glu Leu Leu Lys Glu Asn Leu Arg Cys Leu Val Pro Thr Lys
325 330 335

Asn Arg Asp Val Asp Val Glu Arg Tyr Leu Pro Leu Val Thr Arg Thr
340 345 350

10 Ala Ser Arg Pro Arg Met Leu Ala Leu Arg Arg Val Val Asp Tyr His
355 360 365

Arg Gln Tyr Glu Trp Val

15 370

<210> 12

<211> 171

20 <212> Amino acid

<213> Myxococcus xanthus

<400> 12

Met Asn Thr Pro Ser Leu Thr Asn Trp Pro Ala Arg Leu Gly Tyr Leu

25 1 5 10 15

Leu Ala Val Gly Gly Ala Trp Phe Ala Ala Asp Gln Val Thr Lys Gln

20 25 30

30 Met Ala Arg Asp Gly Ala Lys Arg Pro Val Ala Val Phe Asp Ser Trp
35 40 45

Trp His Phe His Tyr Val Glu Asn Arg Ala Gly Ala Phe Gly Leu Phe

50 55 60

35 Ser Ser Phe Gly Glu Glu Trp Arg Met Pro Phe Phe Tyr Val Val Gly
65 70 75 80

40 Ala Ile Cys Ile Val Leu Leu Ile Gly Tyr Tyr Phe Tyr Thr Pro Pro
85 90 95

Thr Met Lys Leu Gln Arg Trp Ser Leu Ala Thr Met Ile Gly Gly Ala

100

105

110

5 Leu Gly Asn Tyr Val Asp Arg Val Arg Leu Arg Tyr Val Val Asp Phe

115

120

125

Val Ser Trp His Val Gly Asp Arg Phe Tyr Trp Pro Ser Phe Asn Ile

130

135

140

10

Ala Asp Thr Ala Val Val Val Gly Ala Ala Leu Met Ile Leu Glu Ser

145

150

155

160

Phe Arg Glu Pro Arg Gln Gln Leu Ser Pro Gly

15

165

170

<210> 13

<211> 475

D1 20 <212> Amino acid

<213> Myxococcus xanthus

<400> 13

Met Gly Thr Ser Glu Pro Val Glu Pro Asp His Ala Leu Ser Lys Pro

25

1

5

10

15

Pro Pro Val Ala Pro Val Gly Ala Gln Ala Leu Pro Arg Gly Pro Ala

20

25

30

30 Met Pro Gly Ile Ala Gln Leu Met Met Leu Phe Leu Arg Pro Thr Glu

35

40

45

Phe Leu Asp Arg Cys Ala Ala Arg Tyr Gly Asp Thr Phe Thr Leu Lys

50

55

60

35

Ile Pro Gly Thr Pro Pro Phe Ile Gln Thr Ser Asp Pro Ala Leu Ile

65

70

75

80

Glu Val Ile Phe Lys Gly Asp Pro Asp Leu Phe Leu Gly Gly Lys Ala

40

85

90

95

Asn Asn Gly Leu Lys Pro Val Val Gly Glu Asn Ser Leu Leu Val Leu

100 105 110

5 Asp Gly Lys Arg His Arg Arg Asp Arg Lys Leu Ile Met Pro Thr Phe

115 120 125

Leu Gly Glu Arg Met His Ala Tyr Gly Ser Val Ile Arg Asp Ile Val

130 135 140

10

Asn Ala Ala Leu Asp Arg Trp Pro Val Gly Lys Pro Phe Ala Val His

145 150 155 160

Glu Glu Thr Gln Gln Ile Met Leu Glu Val Ile Leu Arg Val Ile Phe

15 165 170 175

Gly Leu Glu Asp Ala Arg Thr Ile Ala Gln Phe Arg His His Val His

180 185 190

D |

20 Gln Val Leu Lys Leu Ala Leu Phe Leu Phe Pro Asn Gly Glu Gly Lys

195 200 205

Pro Ala Ala Glu Gly Phe Ala Arg Ala Val Gly Lys Ala Phe Pro Ser

210 215 220

25

Leu Asp Val Phe Ala Ser Leu Lys Ala Ile Asp Asp Ile Ile Tyr Gln

225 230 235 240

Glu Ile Gln Asp Arg Arg Ser Gln Asp Ile Ser Gly Arg Gln Asp Val

30 245 250 255

Leu Ser Leu Met Met Gln Ser His Tyr Asp Asp Gly Ser Val Met Thr

260 265 270

35 Pro Gln Glu Leu Arg Asp Glu Leu Met Thr Leu Leu Met Ala Gly His

275 280 285

Glu Thr Ser Ala Thr Ile Ala Ala Trp Cys Val Tyr His Leu Cys Arg

290 295 300

40

His Pro Asp Ala Met Gly Lys Leu Arg Glu Glu Ile Ala Ala His Thr

305 310 315 320

Val Asp Gly Val Leu Pro Leu Ala Lys Ile Asn Glu Leu Lys Phe Leu

5 325 330 335

Asp Ala Val Val Lys Glu Thr Met Arg Ile Thr Pro Val Phe Ser Leu

340 345 350

10 Val Ala Arg Val Leu Lys Glu Pro Gln Thr Ile Gly Gly Thr Thr Tyr

355 360 365

Pro Ala Asn Val Val Leu Ser Pro Asn Ile Tyr Gly Thr His His Arg

370 375 380

15

Ala Asp Leu Trp Gly Asp Pro Lys Val Phe Arg Pro Glu Arg Phe Leu

385 390 395 400

Glu Glu Arg Val Asn Pro Phe His Tyr Phe Pro Phe Gly Gly Ile

D) 20 405 410 415

Arg Lys Cys Ile Gly Thr Ser Phe Ala Tyr Tyr Glu Met Lys Ile Phe

420 425 430

25 Val Ser Glu Thr Val Arg Arg Met Arg Phe Asp Thr Arg Pro Gly Tyr

435 440 445

His Ala Lys Val Val Arg Arg Ser Asn Thr Leu Ala Pro Ser Gln Gly

450 455 460

30

Val Pro Ile Ile Val Glu Ser Arg Leu Pro Ser

465 470 475

35 <210> 14

<211> 318

<212> Amino acid

<213> Myxococcus xanthus

40 <400> 14

Met Val Asp Ser Val Ser Lys Gln Ala Arg Arg Lys Val Phe Leu Phe

1 5 10 15

Ser Gly Gln Gly Thr Gln Ser Tyr Phe Met Ala Lys Glu Leu Phe Asp

5 20 25 30

Thr Gln Thr Gly Phe Lys Arg Gln Leu Leu Glu Leu Asp Glu Gln Phe

35 40 45

10 Lys Gln Arg Leu Gly His Ser Ile Leu Glu Arg Ile Tyr Asp Ala Arg

50 55 60

Ala Ala Arg Leu Asp Pro Leu Asp Asp Val Leu Val Ser Phe Pro Ala

65 70 75 80

15

Ile Phe Met Ile Glu His Ala Leu Ala Arg Leu Leu Ile Asp Arg Gly

85 90 95

Ile Gln Pro Asp Ala Val Val Gly Ala Ser Met Gly Glu Val Ala Ala

D | 20 100 105 110

Ala Ala Ile Ala Gly Ala Ile Ser Val Asp Ala Ala Val Ala Leu Val

115 120 125

25 Ala Ala Gln Ala Gln Leu Phe Ala Arg Thr Ala Pro Arg Gly Gly Met

130 135 140

Leu Ala Val Leu His Glu Leu Glu Ala Cys Arg Gly Phe Thr Ser Val

145 150 155 160

30

Ala Arg Asp Gly Glu Val Ala Ala Ile Asn Tyr Pro Ser Asn Phe Val

165 170 175

Leu Ala Ala Asp Glu Ala Gly Leu Gly Arg Ile Gln Gln Glu Leu Ser

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Gln Arg Ser Val Ala Phe His Arg Leu Pro Val Arg Tyr Pro Phe His

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40 Ser Ser His Leu Asp Pro Leu Arg Glu Glu Tyr Arg Ser Arg Val Arg

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10 Arg Ala Pro Ile Gln Leu Tyr Asp Thr Val Leu Gln Leu Glu Gly Gln

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Gly Gly Cys Asp Phe Ile Asp Val Gly Pro Ala Ala Ser Phe Ala Thr

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Glu Gly Ala Ala Arg Phe Arg Val Met Glu Arg Pro Gly Arg Gln His

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Gln Ala Asn Gly Gln Thr Thr Ala His Leu Gly Ala Glu Ile Ala Ser

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Phe Ser Gly Gln Ala Ala Leu Val Thr Val His Glu Ala Trp Asn Ala

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Ala Arg Leu Gln Ala Val Pro Gly His Arg Ile Gly Leu Val Val Gly

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Thr Lys Ser Ile Thr Gly His Gly Leu Ser Ser Ala Gly Ala Val Gly

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Thr Leu Cys Glu Glu His Ala Thr Thr Val Val Leu Glu Gly Leu Pro

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His Val Phe Cys Met Gly Ala Asp Phe Arg Ala Ile His Asp Arg Val

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Ile Gln Arg Ala His Tyr Leu Thr Leu Met Thr Arg Pro Ile Asp Ala

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Glu Lys Leu Leu Arg Leu His Leu Arg Arg Leu Arg Cys Leu Ser Lys

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Gly Asp Gly Arg Asp Thr Cys Val Pro Glu Ala Val Gln His Glu Leu

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Phe Ala Ile Val Gly Ser Tyr Arg Pro Met Leu Ala Ser Met Pro Gln

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His Glu Leu His Leu Asp Arg Thr Leu Asn Val Ile Gly Ser Gly His

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Ile Ala Ala Asp Phe Asn Glu Lys Ala Leu Glu Ala Ala Gly Arg Thr

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Asp Arg Leu Ile Glu Asp Leu Arg Ala Arg Gly Leu Ala Glu Pro Glu

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Asn Thr Leu His Ile Arg Ser Phe Leu Asp His Asp Arg Pro Tyr Gln

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15 Pro Pro Ala Asp Arg Ala Gly Leu His Ala Arg Ile Pro Phe Asp Ser

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